west virginia department of environmental protection

Division of Air Quality
601 57th Street SE
Charleston, WV 25304
Phone (304) 926-0475 • FAX: (304) 926-0479

Earl Ray Tomblin, Governor
Randy C. Huffman, Cabinet Secretary
www.dep.wv.gov

ENGINEERING EVALUATION / FACT SHEET

BACKGROUND INFORMATION

Application No.:	R13-2498B
Plant ID No.:	041-00012
Applicant:	Dominion Transmission, Inc. (Dominion)
Facility Name:	Sweeney Compressor Station
Location:	Camden, Lewis County, WV
NAICS Code:	486210
Application Type:	Modification
Received Date:	April 21, 2011
Engineer Assigned:	John Legg
Fee Amount:	$1,000.00
Date Received:	April 25, 2011
Complete Date:	April 27, 2011
Due Date:	July 26, 2011
Applicant Ad Date:	April 27, 2011
Newspaper:	*Weston Democrat*
UTM's:	Easting: 530.50 km Northing: 4,328.80 km Zone: 17
Description:	Replace a dehydration unit still, reboiler, and flare.

Dominion Transmission, Inc. (Dominion) applied on April 21, 2011 to the West Virginia Department of Environmental Protection (WVDEP), Division of Air Quality (DAQ) for a modification permit (R13-2498B) to the natural gas compressor facility known as Sweeney Station, located on Fink Creek Road near Camden, in Lewis County, WV. Dominion is proposing to replace the glycol dehydration still, reboiler, and flare. Dominion estimates the change in potential emissions resulting from the proposed modification to be:

Pollutant	Emission Change (Indicated by + of -) (ton/yr)
VOC	+0.92
Benzene	-0.33
Toluene	-0.21

Pollutant	Emission Change (Indicated by + of -) (ton/yr)
Ethylbenzene	+1.76
Xylene	+0.50
Hexane	-0.01

The main difference in the new and in the old Dehydration Unit are detailed below:

Dehydration Unit Equipment	Old	New	Comments
Still	325 mmscf/day	320 mmscf/day	New Dehydrator Slightly smaller.
Reboiler	2.5 mm Btu/hr	1.47 mmBtu/hr	Heat Input to New Reboiler less.
Flare	95% Destruction	99% Destruction	New Flare more Destructive!

DESCRIPTION OF PROCESS

Dominion is proposing to replace the existing dehydration unit still (DEHY01), reboiler (RBR01), and flare (FL01) associated with the Glycol Dehydration Unit. The existing contactor tower will remain in place and will be put back into operation. The capacity of the Glycol Dehydration Unit to process/dry natural gas will decrease slightly to 320 million standard cubic feet per day (mmscfd) from 325 mmscfd. The new regenerator still (DEHY02) and the new reboiler (RBR02) will be manufactured by Cameron. The new flare (FL02) will be manufactured by Questor Technology, Inc. Emissions from the regenerator still vent will be routed to the new flare which will be rated/designed to handle 4.0 million BTU per hour (MMBtu/hr) of waste gas, for the control of volatile organic compounds (VOC), hazardous air pollutants (HAP), and odor. The new reboiler will burn natural gas at maximum design heat input of 1.47 MM Btu/hr. The existing dehydration unit still (DEHY01), reboiler (RBR01) and flare (FL01), will be taken out of service.

Table 1: Information about new Deydration Unit, Reboiler, and Flare.

Information	Response
New Glycol Dehydration Unit - DEHY01	
Name	New Glycol Dehydrator Regeneration Still; Cameron, Model 600/1000
Maximum Process Material Charged	Dry Natural Gas @ 320 mmscfd
Projected Operating Schedule	24 hr/day; 7 day/wk; 52 wk/yr
Instrument Air Pressure Required	100 psig
Outlet Gas Water Content (lb/mmscf)	7
Lean Glycol Purity (wt%)	98.5
Glycol Circulation Rate (gpm)	9.77
Recirculation Ratio - Gallon Glycol/ lb H2O	3
Flash Tank Operating Pressure (psig)	50
Flash Tank Operating Temperature °F	150
Pollutants emitted (lb/hr) - no controls	81.16 - VOC; 0.10 - Hexane; 4.96 - Toluene; 24.30 - Xylene; 2.55 lb/hr Benzene; 41.50 - Ethylbenzene

Information	Response
Glycol Heater	
Number of Firetubes	1
Number of Burners/Firetube`	1
Firetube Material	A53B-ERW
Firetube Size/Wall Thickness	12" / .188
Total Firetube Area (ft2)	97.6
Firetube Heat Flux (≤10,000 BTU/hr/ft2)	10249
Number of Stacks	1
Stack Height (ft)	15'-6"
New Reboiler - RBR02	
Manufacturer, Model No.	Cameron 600/1000
Number of Unts	1
Use	Heat dry gas that will be used for the Glycol Dehydration Unit
Maximum Design Heat Input	1.47 MM Btu/hr
Projected Operating Schedule	24 hr/day; 7 day/wk; 52 wk/yr
Type of Fire Burning Equipment	Natural Gas Burner
Inside diameter	1.0 ft
Gas Exit Temperature	1,000 °F
Stack Height	26.6 ft
Natural Gas Feed Rate	1,417 ft^3/hr; 12.4 MM ft^3/yr
Btu Content of Natural Gas	1,038 Btu/ft^3
Pollutants Emitted (lb/hr)	0.10 - CO; 0.13 - NOx; <0.01 PM_{10}; <0.01 SO_2; 0.06 - VOCs
New Flare - FL02	
Manufacturer, Model No.	Questor Technology Inc., Q100
Method	Ground flare
Method of system used	Non-assisted by Steam, Air, or Pressure
Maximum Capacity of Flare	4MM Btu/hr
Dimensions of Stack	1.43 ft - Diameter; 30 ft - Height
Minimum Guaranteed Combust Efficiency	99%
Fuel Used in Burners	Natural Gas
Number of Burners	Waste Gas 4.0 MM Btu/hr; Additional supplemental natural gas - 7.36 cfm
Will preheat be used?	No
Natural gas flow rate to flare pilot flame per pilot light	0.833 scfm

Information	Response
Flare tip inside diameter	18 inches
Number of pilot lights 1	52,000 Btu/hr
Will automatic re-ignition be used?	Yes
Is pilot flame equipped with a monitor?	Yes
Hours of unit operation per year	8,760
Will steam injection be used?	No
Estimated total combustible to flare	5,880 scfh - Waste Gas 441.6 scfh - Assist Natural Gas
Temperature of emission stream	212 - 250 °F
Flare Gas heat content	>200 Btu/ft^3
Flare gas exit velocity	<60 fps
Identify and describe all auxiliary fuels to be burned:	Natural Gas @ 1,038 Btu/scf
Temperature of flare gas	2240 °F

SITE INSPECTION

The writer did not inspect Dominion's Sweeney Station because the facility is routinely inspected by DAQ Compliance and Enforcement Personnel located out of the Charleston Office. Enforcement Inspector Todd Shrewsbury last inspected the facility on September 29, 2009. At that time Mr. Shrewsbury conducted a targeted inspection (FullOnSite) of the whole facility and found it to be in compliance with all applicable rules. Based on the inspection, the facility was given the inspection code of 30. Mr. Shrewsbury is scheduled to conduct another FullOnSite targeted inspection this year.

The directions to Sweeney Station as given in permit application R13-2498B are as follows:

> Take Interstate I-70 North to Weston/Buckhannon exit (Exit 99). Take Route 33 to Weston. Go straight through two stoplights and at the third light (at Main Street), turn left. Go one block to 2nd Street, next light, and turn right, following Route 33 West. Travel approximately 6 miles to Camden. Turn right on Country Route 9 and go 6.3 miles to Country Route 6 and go 1.7 miles. Station is on left side of road across a small bridge.

ESTIMATE OF EMISSIONS BY REVIEWING ENGINEER

Dominion's emission calculations were reviewed by the writer and were found to be creditable. Dominion use the Glycalc program to calculate emissions from the glycol dehydrator, reboiler, and flare. Glycalc output emissions (after controls/flare) are given below along with the input data that was used to generate the emission information.

Table 2: Controlled Emissions from the Glycol Dehydrator, Reboiler, and Flare, Sweeney Compressor Station.				
Pollutant	**Annual Controlled Emissions (ton/yr)**			
	Glycol Dehydrator	**Reboiler**	**Flare**	**Total Sources**
PM	---	0.01	---	0.01
SO_2	---	0.01	---	0.01
NOx	---	0.57	2.09	2.66
CO	---	0.44	0.15	0.59
VOC	3.56	0.26	0.02	3.83
Total HAPs	3.22	0.01	---	3.23
CO_2	---	745.6	1,417.18	2,162.82

Table 3: Controlled Emissions (After Flare) for Regenerator Still Vent , Sweeney Compressor Station.							
Units	**VOC**	**Hexane**	**Benzene**	**Toluene**	**Ethylbenzene**	**Xylene**	**Total HAP**
lb/hr	0.81	0.00	0.03	0.05	0.42	0.24	0.73
ton/yr	3.56	0.00	0.11	0.22	1.82	1.06	3.22

Table 4: Input Data to Glycalc, Sweeney Compressor Station.		
Input Description		**Input Numerical Value**
Maximum Operation Hours		8,760 hr/yr
Glycol Type		TEG
Maximum Dry Gas Throughput		320 mm scfd
Wet Gas Pressure		700 psig
West Gas Temperature		60 °F
Dry Gas Water Content		7 lb H2O/mmcf
Lean Glycol Recirculation Rate		3 gal/lb H2O
Lean Glycol Water Content		1.5% by weight
Flash Tank Temperature		150 °F
Flash Tank Pressure		50 psig
Flare Data:	Efficiency	99 %
	Ambient Temperature	68 °F
	Excess Air	5%
	Waste Gas Flow Rate	5,880 scfh
	Supplemental Natural Gas Flow Rate	441.6 scfh

Table 4: Input Data to Glycalc, Sweeney Compressor Station.		
Input Description		**Input Numerical Value**
	Pilot Gas Flow Rate	50 scfh
	Maximum Operation Hours Waste Gas	8,760 hr/yr
Reboiler Maximum Heat Input		1.47 MM Btu/hr
Reboiler Maximum Natural Gas Usage		1,417 cf/hr
		1037.6 Btu/cf
		12.41 mm cf/yr

REGULATORY APPLICABILITY

Sweeney Station is located in Lewis County, which is in attainment for all criteria pollutants.

45CSR2 - " To Prevent and Control Particulate Air Pollution from Combustion of Fuel in Indirect Heat Exchangers."

The new reboiler (like the old reboiler) will be subject to this rule.

Section 45-2-3 - "Visible Emissions of Smoke and/or Particulate Matter Prohibited and Standards of Measurement." Smoke/particulate matter into the open air is limited to 10% opacity based on a six minute block average. The reboiler is not subject to 45-2-4 - "Weight Emission Standards."

45CSR6- "To Prevent and Control Air Pollution from Combustion of Refuse."

The new flare (like the old flare) is considered an incinerator and will be subject to the requirements of this rule. Particulate matter emissions are limited to the value derived in the equation in section §45-6-4.1. Opacity is limited to less than 20%, except less than 40% opacity is permitted for a period aggregating no more than 8 minutes per startup, per §45-6-4.3 and 4.

45CSR10- "To Prevent and Control Particulate Air Pollution from the Emission of Sulfur Dioxide."

Once per year, the inlet natural gas stream from the station is to be tested using gas chromatography for the presence of sulfur and H_2S. Proof of compliance is demonstrated if the result for sulfur is 0.422 grains/100 ft^3 or less, and the result for H_2S is 50 grains/100 ft^3 or less.

45CSR10 does not apply to the reboiler because the unit is less than 10 MM Btu/hr.

45CSR14 - "Permits for Construction and Major Modification of Major Stationary Sources of Air Pollution for the Prevention of Significant Deterioration."

The station is a major source of NO_x emssions (>250 ton/yr).

The replacement of the dehydrator still, reboiler and flare does not result in a major modification and therefore is not subject to 45CSR14/ Prevention of Significant Deterioration (PSD) review.

	Controlled Emissions (After Flare) for Glycol Dehydrator, Reboiler and Flare (99% Efficient), Sweeney Compressor Station.						
	Units	**PM**	**SO_2**	**NO_x**	**CO**	**VOC**	**Total HAPs**
After R13-2498B	ton/yr	0.01	0.04	2.66	0.59	3.83	3.23
Before R13-2498B		0.01	0.04	2.66	0.59	2.91	1.52
Delta (After - Before)		0.00	0.00	0.00	0.00	+0.92	+1.71

40 CFR 60, Subpart A - "General control device and work practice requirements."

The minimum heating value of the waste gas will be 200 Btu/ft3 of gas, per §60.18(c)(3)(ii) for non-assisted flares.

The maximum exit velocity of flare will be 60 feet per second (fps), per §60.18(c)(4)(i).

40 CFR 63, Subpart HH - "National Emission Standards for Hazardous Air Pollutants from Oil and Natural Gas Production Facilities."

This subpart applies to owners/operators at a natural gas production facilities. The Sweeney Station is a natural gas transmission and storage facility, not a natural gas production facility, i.e., this rule is not applicable to the facility.

40 CFR63, Subpart HHH - "National Emission Standards for Hazardous Air Pollutants from Natural Gas Transmission and Storage Facilites."

This subpart applies to owners/operators of natural gas transmission and storage facilities that are major HAP sources. The Sweeney Station is a natural gas transmission and storage facility, but remains classified as an area source of HAPs, i.e., this rule is not applicable to the facility.

TOXICITY OF NON-CRITERIA REGULATED POLLUTANTS

No new species of HAP were emitted because of the proposed changes in R13-2498B.

According to Dominion, total HAP emissions from the dehydration unit increased by +1.71 ton/yr (with ethylbenzene emissions increasing +1.76 ton/yr). This is thought (by the writer) to result from the decrease in design heat input of the reboiler:

Reboiler ID	MDHI (mm Btu/hr)
REBR01 (Old)	2.50
REBR02 (New)	1.47

AIR QUALITY IMPACT ANALYSIS

No computer modeling studies were done for this review.

MONITORING OF OPERATIONS

4.2. Monitoring Requirements

- **Reboiler Opacity.** If asked by DAQ , the permittee is conduct Method 9 emission observations to demonstrate compliance with 10% opacitiy requirement.

- **Flare and Pilot Flame**. The permittee is to record on a monthly basis the date, time, and duration of any occurrence of pilot flame absence for the Flare (FL02). If the pilot flame was operational for the entire month, the permittee is to note in the records that the pilot flame was operational the entire month.

- **Flare Fuel Minimum Heating Value and Maximum Exit Velocity.** The permittee is calculate and record for each month on a monthly basis the minimum heating value of the flare waste combustion gas and the maximum flare exit gas velocity.

4.3. Testing Requirements

- **Flare Opacity.** In order to demonstrate compliance with the no visible emissions requirement for the flare, the permittee shall conduct a Method 22 opacity test for at least two hours to demonstrate that no visible emissions were observed for more than a total of 5 minutes during any 2 consecutive hour period. The permittee is conduct this test within one (1) year of permit issuance or initial startup whichever is later. The visible emission checks shall determine the presence or absence of visible emissions. Observer knowledge about opacity testing is discussed.

- **Flare Design and Operation**. If requested by the DAQ, the permittee is to offer proof that the flare pilot light is operated at all times, that the flare is burning emissions from the dehydration still at 200 Btu/scf or greater, that the maximum exit velocity of the flare is 60 ft/sec or less, and that there are no visible emissions coming from the flare.

- **Facility HAP Potential.** Upon the request of the DAQ, the permittee is to offer proof (GlyCalc runs, sample analysis, etc.) that the facility is a minor source of HAP.

4.4. Recordkeeping Requirements

- **Flare Pilot Flame**. The permittee is maintain records of the times and duration of all periods when the flare pilot flame was absent.

- **Flare Design and Operation**. The permittee is to maintain a record of the flare design evaluation. It should include, net heat value calculations, exit (tip) velocity calculations, and all supporting concentration calculations and other related information that could be requested by DAQ.

- **Facility HAP Potential.** To demonstrate that the facility is a minor source of HAP, the permittee is to maintain records of testing conducted in the past that shows this.

- **Monitoring and Testing Requirement Records.** The permittee is document and maintain the records on an on-going basis as outlined in the monitoring and test requirement sections give above.

- **Flare No Visible Emissions.** The permittee is maintain records of the visible emission opacity tests that have been conducted.

- **Facility HAP Potential.** The permittee is to maintain a record of all potential to emit (PTE) HAP calculations for the entire affected facility including the natural gas compressor engines and ancillary equipment.

- **Maximum Wet Natural Gas Throughput Limitation.** The permittee is to maintain records of the wet natural gas throughput for the dehydration system to demonstrate that the throughput does not exceed 320 mm scf/day and 116,800 mm scf/yr.

4.5. Reporting Requirements

- **Facility HAP Potential.** If requested by DAQ, the permittee is to submit testing protocol at least thirty (30) days prior to testing and submit notification of the testing date at least fifteen (15) days prior to testing. The permittee is submit the test results within sixty (60) days of testing and provide all supporting calculations and testing data.

- Any deviation(s) from the allowable visible emission requirement for any emission source discovered during observations using 40 CFR Part 60, Appendis A, Method 9 or 22 ist to be reported in writing to the Director as soon as practicable, but no later than ten (10) calendar days of the occurrence and

is include: the results of the visible determination of opacity of emissions, the cause or suspected cause of the violation(s), and any corrective measures taken or planned.

- Any deviation(s) from the flare design and operation shall be reported in writing to the Director as soon as practicable, but no later than ten (10) calendar days of discovery of such deviation.

CHANGES TO PERMIT R13-2498B

R13-2498B was essentially rewritten. R13-2498A was revised for the new dehydrator, reboiler, and flare, and was put into the newer/longer Title V-like format. The general permit G35-A requirements were also added to R13-2498B.

RECOMMENDATION TO DIRECTOR

Dominion's request to replace a dehydration unit still, reboiler, and flare at the Sweeney Station located near Camden in Lewis County, WV meets the requirements of all applicable rules and therefore permit R13-2498B should be granted.

John Legg
Permit Writer

June 16, 2011